



PATENT ABSTRACTS OF JAPAN

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(72)Inventor : AKAHA TATSUO

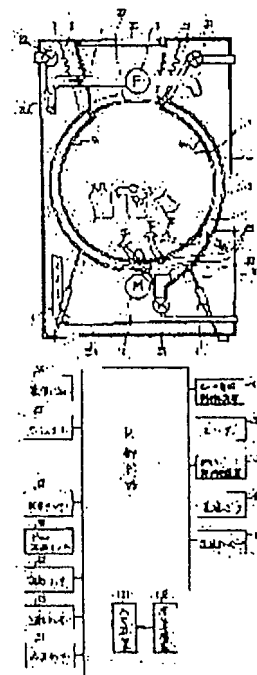
SUSAMI MASAFUMI

(54) FULLY AUTOMATIC WASHING MACHINE WITH DRYER

(57)Abstract:

PURPOSE: To prevent the overdrying of washed articles by measuring the quantity of washed articles in a drum in the washing process from a motor electric current and memorizing the quantity of the washed articles, and setting the drying time in correspondence with the quantity.

CONSTITUTION: Since the dc motor 12 of a water tank 5 is controlled through the PWM method by a PWM controller 12 through a control circuit MC, if the revolution driving torque of a drum 7 increases, the electric current value increases automatically, and control is performed, keeping the prescribed number of revolution. The electric current supplied to the dc motor 12 is memorized and calculated by the controller MC, and used as the data in the fuzzy estimation for the quality and quantity of washed articles W. Since the quantity of the washed article W is memorized in the controller MC, the drying completion time can be estimated approximately in the continuous process from washing to drying, and drying is allowed to proceed through the fuzzy estimation and control. And the thermal output of a heater 30 is varied nearly at the drying completion time, and drying can be completed with a desired degree of drying.





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CLAIMS

[Claim(s)]

[Claim 1] The drum which is supported pivotable within a tank and has many through-holes for water flow and ventilation in a peripheral wall, In the full automatic wash dryer which comes to have the motor made to rotate a drum and the control means which controls rotation of the drum in each process of wash, dehydration, and desiccation A measurement means by which a control means detects the energization current of a motor and measures the amount of the washing in the drum in a wash process, The full automatic wash dryer which is equipped with a storage means to memorize the amount of the washing measured by the measurement means, and a drying-time setting means to set up the drying time in a desiccation process at least corresponding to the amount memorized by the storage means, and can carry out adjustable [of the drying time] corresponding to the amount of the washing.

[Translation done.]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the full automatic wash dryer which soaks in more detail about a drum-type full automatic wash dryer, holding in a drum the washing (clothing which should be washed and dried), and performs a process, a wash process, a rinse process, a dehydration process, and a desiccation process.

[0002]

[Description of the Prior Art] In recent years, the approach one equipment performs from wash of clothing to desiccation also at a general home from the field of rationalization of a life is required, and a drum type wash dryer is beginning to spread as the one solution. Since a drum type wash drier is washing by the tumbling, it has few [and] advantages also with few cloth bruises with [of the washing in a washing process] slag, and there is also little water consumption. Although there is also a quiescence desiccation method to dry without on the other hand carrying out the tumbling of the clothing if it is in a clothes dryer, an advantage, like the tumbling desiccation on a drum is efficient and there is little damage on a cloth bruise is got. The one apparatus drum type wash dryer combining and [wash] and a desiccation drum is in the limelight in accordance with the needs of social life rationalization from the above-mentioned situation.

[0003] although it carries out, and deflection and the time amount which it is large and wash takes with same whenever [washing] differing [unavoidable] also compare with the present pulsator type automatic washing machine whenever [washing] with the amount of the washing when there are many amounts of the washing even if it carries out time-amount wash and twice [about] require, since washing of a drum type wash drier is a natural fall impact by the tumbling -- the bruise of clothing -- about [of the thing of a pulsator type] -- it can say that it is a wash method very gentle to clothing in one half. That from which there is no active mechanical power which wash takes long time amount to or the thing with large deflection contributes to washing whenever [washing], and the condition of clothing cannot change easily (remarkable when there are many loads) is a factor. The desiccation warm air and exhaust air which sets at a desiccation process, and is introduced and discharged into a drum by the tumbling desiccation method are sensed with a humidity sensor, or the temperature differential of the introductory warm air temperature to a drum and the exhaust air temperature from a drum is detected, aridity is detected, and desiccation operation is performed. Since it is the difference of the temperature change although two thermo sensors have detected termination of desiccation according to the ON appearance warm air temperature gradient to a drum, after, as for desiccation termination, the amount of [of the washing] water evaporates, elevated-temperature-ization of clothing is not avoided. Moreover, in order to lose desiccation nonuniformity and to obtain good desiccation, since the desiccation purpose is attained by making the whole clothing into fault dryness, there is a field which cannot avoid the heat damage of clothing weak with heat easily due to elevated-temperature-izing of clothing. In order to raise the washing engine performance and to raise drying ability, it operated by having sometimes carried out inverse rotation of the rotation of a drum, and has tied to improvement in the aforementioned engine

performance.

[0004] Moreover, JP,1-274797,A is one of those used fuzzy reasoning for the washing machine. A wash predetermined time is expressed with the form of a membership function, and this configuration shows the height of possibility that wash will be completed by each time amount. Decision of the wash termination under wash integrates with the membership function of fault schedule wash time amount, and it normalizes it so that the maximum of grade may be set to 1. When fixed time amount progress is carried out, it is shown how much possibility that wash is completed there are. The value of whenever [washing] is calculated by the change degree within fixed time amount of the output of a photosensor. The comparison with whenever [washing], and the integral of said schedule wash time amount is performed, and when the value of whenever [washing] is less than the value of the integral of a wash predetermined time, it is considering as termination of wash.

[0005]

[Problem(s) to be Solved by the Invention] As goods which reply to the rationalization needs of a life, the drum type wash dryer which can be automatically operated from wash to desiccation is beginning to spread. This drum type wash dryer is a device by which the process at which a user moves the washing from a washing machine to a dryer is skipped, it is what matched laborsaving needs by the purpose integration of a drum required for wash, and a drum (each drum) required for desiccation, i.e., necessary components indispensable to both opportunities, and it can be said that equipment approached human being 1 step.

[0006] However, the distance of equipment and human being is still large. The interface of equipment and human being is the present condition left only to the control panel of equipment. In order to satisfy a demand at each process from wash to desiccation, the operating procedure of a control panel is complicated or it has caused confusing [of a display]. On the other hand, it is not rare to have not resulted in sufficient engine-performance exertion, but to have caused a user's dissatisfaction by the simplification of operability or a display,, either.

[0007] That is, equipment is wanted to approach human being by the improvement of the interface of equipment and human being. In the present laundry device, the place which cannot say that desiccation is attained by automatic control easily about wash and desiccation from wash which a user desires, and is depended on the device of the direction using a user's equipment is large. In other words, the essence expected from wash and a dryer removes dirt, without damaging clothing, and it aims at securing the dryness (aridity) of the request without desiccation nonuniformity, without damaging clothing.

[0008] These troubles are as follows.

1) Since neither the information acquired at the last process when the control function of a wash process, a dehydration process, and a desiccation process was not what organically combined independently, respectively, nor the carried-out data of a result is reflected in a back process A back process becomes unripe and achievement of the essence (remove dirt, without damaging clothing, and secure the dryness (aridity) of the request without desiccation nonuniformity, without damaging clothing) of wash - desiccation is inadequate. For example, an amount of the washing, the quality, the wash water temperature, etc. which were obtained at the wash process rinse, and are not fully utilized as control information of each process of dehydration and desiccation.

2) Depending on water temperature and immersion time amount, if it is optimal water temperature and an environment, disassembly of dirt will also shorten early, therefore wash time amount, work of a detergent enzyme weakens the strength of washing, and although mitigation of a cloth bruise is possible, in the present equipment, fine washing corresponding to change of conditions (water temperature, immersion time amount, extent of dirt, the quality of the washing, amount, etc.) is not perform. Moreover, in the rinse process, it rinses according to water temperature, or the quality and the amount of the washing, and amount of water, rinse time amount, rinse strength, etc. do not correspond finely.

3) About desiccation, since detection of the high desiccation degree of precision is difficult, by ending a desiccation process by fault dryness, desiccation nonuniformity is prevented, it is the aridity for which it asks like an iron course, and it is in the very difficult present condition to end a desiccation process.

[0009] Furthermore, since there is no desirable desiccation means if it results in the desiccation method

of delicate clothing, manuals, such as a restroom and day drying in the shade, have been entrusted.

4) Although wash and a dryer have advanced nature in space-saving nature by common-use-izing a drum and unifying a wash function and a desiccation function, since it is not necessarily carrying out integrated control of a series of processes from wash to desiccation in a control function, the goodness of being one apparatus demonstrates it and it is not off. The amount of the washing, nature detection (wash load detection), and a desiccation load detection function are not equipped, and the activity to the back process (desiccation process) of the data obtained at the last process (wash process) is not carried out, either. Although placed between purpose-oriented by the sensor function in each process of wash, dehydration, and desiccation, it is difficult to utilize for a sake as a database of integrative control. Within the same drum, the Khai ** of the amount which can perform wash or desiccation is carried out sharply, and it cannot fully demonstrate the expected function of wash / desiccation unification.

[0010] Present condition level is volume ratio (load kg / drum volume l) =9.5-10 of wash, and volume ratio =18-23 of desiccation, and is desiccation load kg / wash dosage kg**0.5. That is, in the wash dryer which can wash the 6kg washing, it has the technical problem that 3kg desiccation is an upper limit. This invention was made in consideration of the above-mentioned situation, and tends to offer the full automatic wash dryer which may dry the washing, using effectively the information about the amount of the washing measured in the wash process.

[0011]

[Means for Solving the Problem and its Function] The drum which this invention is supported pivotable within a tank and has many through-holes for water flow and ventilation in a peripheral wall, In the full automatic wash dryer which comes to have the motor made to rotate a drum and the control means which controls rotation of the drum in each process of wash, dehydration, and desiccation A measurement means by which a control means detects the energization current of a motor and measures the amount of the washing in the drum in a wash process, It is the full automatic wash dryer which is equipped with a storage means to memorize the amount of the washing measured by the measurement means, and a drying-time setting means to set up the drying time in a desiccation process at least corresponding to the amount memorized by the storage means, and can carry out adjustable [of the drying time] corresponding to the amount of the washing.

[0012] A measurement means measures the amount of the washing from the energization current of the motor made to rotate a drum in a wash process, and a storage means is made to memorize it in the above configuration. In a desiccation process, a drying-time setting means sets up the drying time corresponding to said amount memorized by the storage means. Fault desiccation of the washing is prevented by a desiccation process being performed by this set-up drying time.

[0013]

[Example] It explains to a detail based on one example which illustrated this invention below. In addition, this invention is not limited by this example. Drawing 1 and 2 are the outline organization charts showing the drum type full automatic wash dryer of one example of this invention. As shown in drawing 1 and drawing 2, in the tank 2 which is the sheathing, the drum type full automatic wash drier 1 is in the interior of the tank 5 which it was hung by the spring 3 and supported with the absorber 4, and a tank 5, was supported pivotable around a horizontal axis 6 and 6', and is equipped with the drum 7 which holds Washing W. Horizontal-axis 6' of a drum 7 is prepared in the 1 side-attachment-wall side in a drum 7 rotatable at the tank 5 according to the bidirectional immobilization-system bearing device 9 which can be fixed to a tank 5 so that rotation inhibition of forward, inverse rotation ease and forward rotation, and the inverse rotation may be carried out according to an individual, and it is constituted so that control of rotation and immobilization may be performed by the bidirectional fixed bearing control unit 8. A drum 7 is supported to revolve by bearing 1010' and horizontal-axis 6' is supporting the rocking disk 11 which adjoined the drum side attachment wall and was prepared free [rotation] and possible [forward inverse rotation immobilization of a drum 7]. And rocking disk circulation vents H1 and H2 through which two or more projections 11a and 11a for stirring the washing in a wash process or a desiccation process on this rocking disk 11 are formed, and the circulation wind for desiccation passes in a desiccation process Much Hn(s) are prepared.

[0014] The bidirectional rotation bearing control device 8 and the bidirectional immobilization-system bearing device 9 have the principle device shown in drawing 3, drawing 4, and drawing 5, and drawing 3 is the outline block diagram showing the whole device. Drawing 4 and drawing 5 show the state diagram to which position control of the cylindrical bearings 9a, 9b, and 9c is carried out with control pins 52a, 52b, and 52c within the bearing case 52 of the bearing device 9. That is, drawing 4 is condition cross-section schematic drawing when control pins 52a, 52b, and 52c are inserted into a bearing case 52, and drawing 5 is condition cross-section schematic drawing in case control pins 52a, 52b, and 52c do not exist in a bearing case 52. A magnet 54 controls the pin stationary plate 53 which fixed control pins 52a, 52b, and 52c in response to the signal from the control unit MC shown in drawing 12 by the plunger 55 free [receipts and payments]. Between each bearing of the cylindrical bearings 9a, 9b, and 9c, Spacers 56a, 56b, and 56c are arranged, and the motion of bearing is made good. horizontal-axis 6' -- forward -- reverse -- drawing 5 which shows that it is in the condition of rotating in the direction of either -- setting -- forward -- reverse -- both -- the one side (respectively a clock rotation side or a counter-clockwise side) of two bearings 9a, 9b, and 9c -- a lock condition -- becoming -- a drum 7 -- Washing W -- forward -- reverse -- whichever it carries out a tumbling, the rocking disk 11 continues holding the location, without taking and rotating for the washing W of a drum 7. Moreover, in drawing 4, the cylindrical bearings 9a, 9b, and 9c pinched by control pins 52a, 52b, and 52c do not bar rotation of horizontal-axis 6'.

[0015] The drum 7 is carrying out the shape of a cylindrical shape, it rotates by the signal from a control unit MC (drawing 14) by DC motor 12 attached in the tank 5, and normal rotation or inversion control is carried out at the rotational frequency specified while the rotation sensor 43 detected the rotational frequency. moreover, a wash (tumbling wash) operation control is carried out by engine-speed omegas fewer than critical engine-speed omegao to which the engine speed of a drum 7 carries out the tumbling of the washing W in a wash process, or A wash (light washing wash which passes wash liquid while it had been made to stick to drum wall) operation control is carried out by larger rotational frequency omegah than critical rotational frequency omegao, or An operation control is carried out as a high washing method which heightened the detergency by the tumbling on a drum 7, fixing the rocking disk 11 and applying external force (mechanical power) to Washing W. In addition, it asks by the degree type, namely, critical rotational frequency omegao is $m g = m r \omega_{\text{gao}}^2 \dots (1)$

[0016]

[Equation 1]

$$\omega_o = \sqrt{g / r} \dots (2)$$

[0017] However, m is [the radius of a drum and g of the mass of the washing and r] gravitational acceleration. therefore, the force F which an engine speed required for critical engine-speed omegao or a tumbling originates in vibration (the synthetic mass center of gravity of Washing W will stop existing on a horizontal axis 6 and 6', and will cause vibration if the distribution in the drum of Washing W is not uniform and the distribution condition of mass does not become uniform) of a drum 7, and is generated is searched for by the degree type -- having -- namely, -- $F = M + m A r \omega_{\text{gao}}^2 \sin \omega_{\text{gao}} t \dots (3)$

It is come out and expressed. However, mA shows imbalance mass.

[0018] The weight of an airframe becomes heavy and is not desirable, although it is also possible to attach a concrete block, an iron lump, etc. for a tank as weight for vibrationproofing, to enlarge gross mass of an oscillating object, and to ease vibration ($M \gg m A r \omega_{\text{gao}}^2 \sin \omega_{\text{gao}} t$) since total of the mass hung [DC motor / 12 / the tank 7 supported by the spring 3 or the absorber 4, the drum 5,] is M.

[0019] In this invention, since the rotational frequency of DC motor 12 can set up freely, it is possible to bring the vibration at the time of rotation ($\omega \gg \omega_o$) of a drum 7 close to the vibration at the time of no-load by what consistent mass of the washing W in a drum 7 is made uniform for (the location of the synthetic center of gravity of the washing W distributed in the drum comes to the location which is in agreement with a horizontal axis 6 and 6'). A pattern until the washing W in a drum 7 takes to rotation accelerating of a drum 7, and sticks to the peripheral wall of a drum 7 gradually and all the washing W is soon distributed in the shape of a doughnut, and the flow chart of the control in that case

are as having been shown in drawing 6 .

[0020] In a dehydration process, like drawing 6 , since the washing W which was carrying out the tumbling within the drum 7 sticks to a drum peripheral wall gradually and is fixed to it with accelerating of drum rotation, the apparent diameter of a drum (diameter of an inner ring of spiral wound gasket of the clothing which stuck) is minor-diameter-ized, and all the washing sticks to the peripheral wall inside of a drum 7 soon. If the mass distribution of Washing W is good, the center of gravity of the washing distributed in the peripheral wall of a drum 7 will be in the condition of generating only a very low vibration at the time of centrifugal hydroextraction (800 - 1000RPM), in accordance with the horizontal-axis [which carries out rotation support of the drum 7] 6, and shaft top of 6'. In a dehydration process, from horizontal-axis 6' which is fixing the rocking disk 11 being controlled by the condition in which forward inverse rotation is free (condition of drawing 4), the rocking disk 11 is taken to a drum 7 and Washing W, and carries out synchronous rotation.

[0021] In drawing 6 , after performing a wash process (step S1), a rinse process (step S2), and a wastewater process (step S3) one by one, a drum 7 rotates at the low speed of for example, 50r.p.m (step S4). In this low-speed rotation, Washing W is unfolded by the tumbling and comes to be shown in (a) of this drawing. DC motor 12 is controlled and a balance roll control is performed so that rotation of this rear drum may serve as the number of rotations of 60 - 120r.p.m. (step S5). And vibration with the lengthwise direction of a drum 7 and a longitudinal direction is detected with a sway sensor 42 (step S6), if the vibration becomes size, step S4 will be performed again, and if it is smallness, a high-speed dehydration process (step S7) will be performed. It moves to a desiccation process (step S8) after this.

[0022] a desiccation process -- setting -- the rocking disk 11 -- the forward inverse rotation of a drum 7 - - receiving -- rotation -- being free (drawing 4) -- it becomes, or it is controlled to be in a fixed condition (drawing 5), and the rotational frequency ω of a drum 7 is operated by the signal from a control unit MC with a rotational speed predetermined on the conditions of $\omega \leq \omega_0$, or the conditions of $\omega > \omega_0$. although a drum 7 will be driven by the direct-current motor 12 like the above, the driving force of its normal rotation and inversion is transmitted to a horizontal axis 6 with the bottom pulley 13, a belt 14, and the upper pulley 15 -- having -- a drum 7 -- forward -- reverse -- a rotation drive is carried out at all. In addition, the horizontal axis 6 is supported by bearing 10'. The drum cinclides 16 and 17 are formed in the peripheral wall of a drum 7 as a part of warm air supply means, and an inflow and exhaust port of wash water. And the fan motor 19 for ventilation is arranged by the warm air circulation path 18 of the exterior of the tank 5 in a tank 2 as a part of ventilation circulation means.

[0023] The fan ducts 20 and 21 containing the fan motor 19 for ventilation It connects with other side attachment walls in the shape of a closed pool through the dehumidifier 24 having the sprinkler 23 which sprinkles the dehumidification water supplied from the feed valve 22 for dehumidification water from one side of the side attachment wall of a tank 5. L of the circulation style flows in the direction of an arrow head, and is the flank holes 25a and 25b of a drum 7, and the rocking disk circulation warm air holes H1 and H2.... Warm air circulation is carried out through Hn, and Washing W is dehumidified and dried.

[0024] It is mixed with the water supplied into the tank 5 from the feed valve 28 and the water supply hose 29, and at least water sinks the lower part of the drum 7 by which the amount of conventions was regulated by the sensor 32, is immersed in Washing W, and a wash process starts the washing W which opened the sheathing lid 26 and the drum lid 27, and was thrown in into the drum 7, and a detergent. In a wash process, the water level in a tank 5 falls and the amount of water reducing is detected [the amount of water to which it sank into wash water and Washing W absorbed water for Washing W] at least for water by the sensor 32 by the tumbling by rotation of a drum 7. The amount of the water which absorbs water for Washing W is the order of cotton > mix spinning > man-made fiber.

[0025] If a wash process is continued further, the air bubbles in clothing are driven out and it sees, and water level will decrease further and detection of water level will be again performed at least for water by the sensor 32. Make up water is supplied from a feed valve 28 by water reducing, and the supplied water supply amounts are used as data when calculating with a control device MC and carrying out

fuzzy reasoning of the quality and the amount of Washing W in the fuzzy reasoning section in a control board.

[0026] Since it is controlled by PMW control unit 12' by PWM through the control circuit MC, the roll control of DC motor 12 attached in the tank 5 is carried out a current value increasing automatically and maintaining a predetermined rotational frequency, if the rotation driving torque of a drum 7 becomes large. That is, although the difference of the need running torque at the time of the drum half rotation by which Washing W is lifted by the baffle 44 in a drum 7 in the upper part of a drum 7, and the drum half rotation to which Washing W falls is large, the drum rotational frequency stabilized by PWM control is obtained.

[0027] Although big running torque is required even if it is a little load, since the washing of cotton has much moisture content and the consistency is comparatively high, even if man-made fiber is the mass as cotton even with after [same since the bulk burr is larger than cotton] water also with little moisture content, small running torque will be sufficient for it. This is for the synthetic center of gravity of Washing W to approach the axial center of a drum 7. Since it is always bulky to the upper part with the horizontal axis 6 of a drum 7, and 6' when the washing W near the washing capacity limitation of a drum 7 is in a drum 7, even if it is the washing which carried out water, running torque is comparatively small, and although the same value as running torque when there is little washing W may be shown, there are many amounts of water reducing of the water at the time of water supply. The amount of Washing W is distinguished with two kinds of data, the amount data of water reducing, and the current value data which running torque takes.

[0028] The supply current value to above-mentioned DC motor 12 is used as data when memorizing with a control unit MC, and calculating with a control unit MC, and carrying out fuzzy reasoning of the quality and the amount of Washing W in the fuzzy reasoning section in a control board. The storage-of-water section WTK is formed in the lower part of a tank 5, and it is prepared so that it may sink, even when a heater 30 chooses any of each wash course or a steam refresh course into the storage-of-water section WTK. However, when a steam refresh course is selected, it is controlling to the water level to which the water surface does not contact the peripheral wall of a drum 7 by rotation of a drum 7. In the desiccation process, although heating operation of the heater 30 is carried out in air, heat-resistant-like consideration is carried out. At the time of desiccation termination, Washing W becomes an elevated temperature, heat damage of the washing W is carried out, or a control unit MC calculates on the basis of the data of temperature-change Δt detected with the thermistor 37 prepared in the ventilation circulatory system way, and a supply current value is controlled so that it becomes fault desiccation and the cooling process after wash termination does not long-duration-ize. About the step of this control, it mentions later.

[0029] Every price of Washing W, at a process and a wash process, after at least water is set as predetermined water level by the sensor 32, it energizes at a heater 30 and warming of wash water is started, but when the coolant temperature sensor 31 has sensed water temperature and it is judged as sufficient temperature for wash in summer when supplied water temperature is high, warming at a heater 30 may not be carried out. the temperature of wash water is detected and controlled by the coolant temperature sensor 31 -- having -- the price -- the die length of soaking time is decided or it is used as data in case fuzzy reasoning of the strength [a wash process] of washing and the die length of wash time amount is carried out and they carry out a fuzzy control.

[0030] Every price, a drum 7 rotates intermittently (abbreviation half rotation), and the inside of a process keeps good contact for wash liquid and Washing W, and it is devised so that activation of an enzyme may be attained, fuzzy reasoning may be carried out and fuzzy wash control may raise washing. If it activates from about 10-degreeC, activation becomes a peak by 30-40-degreeC and a detergent enzyme becomes more than 50-degreeC, what deactivates gradually is common.

[0031] Every price, during washing, when water temperature is comparatively low, on-off operation is made [many], and by 35-40-degreeC with high water temperature, the number of on-off operation is reduced, and total of activation by mechanical power and activation by temperature is made almost the same, or when water temperature is low, it is carried out fuzzy reasoning and a fuzzy control so that it

may attach, the number of on-off operation may be increased for soaking time for a long time and the enzyme effectiveness may be pulled out. After wash is completed, and opening a drain valve 33 and draining from exhaust hose 33A, it shifts to a dehydration process.

[0032] In order to distribute a drum 7 over the peripheral wall of a drum 7 uniformly after it unfolds the lump of the deviation of the washing W which unfolded by DC motor 12 and rotated by the about 50 rotation rpm, and the cloth twisted with slag as mentioned above Carrying out predetermined time rotation at a predetermined rotational frequency to 60rpm - 120rpm, accelerating rotation is carried out and it is operated. The sway sensor 42 which detects vibration with the lengthwise direction and longitudinal direction which unfolded the account of a top and were fixed to the tank 5 in the generating oscillating value v in each process from rotation to about 120 rpm detects, and it compares with the vibration level beforehand memorized in the control device MC. A control unit MC judges whether it is necessary to carry out fuzzy reasoning of the quality of the distribution condition of the washing W in a drum 7, to unfold whether it shifts to high-speed rotation ($\omega >> \omega_0$) of a centrifugal hydroextraction process, and the first stage, to redo from rotation, and to make distribution of clothing into homogeneity, and it necessary to attain low vibration-ization at the time of high-speed rotation.

[0033] A judgment of a control device MC is made, after the data under balance roll control (about 60 rpm->about 70 rpm->about 80 rpm ... about 120 rpm) of a drum 7 are inputted into a control device MC and a comparison operation is carried out to default value, and fuzzy reasoning and fuzzy dehydration operation are carried out. And a control unit MC outputs the signal which carries out unattended operation initiation of the desiccation process. That is, DC motor 12 is operated and it energizes at a heater 30, and between [S] the drum peripheral wall of a drum 7, and the tank inner circle wall of a tank 5, 35 of the rotating flow style by rotation of a drum 7 occurs, and the air heated at the heater 30 is introduced as 36 of the introductory style into a drum 7 through the drum cinclides 17 by rotation of a drum 7.

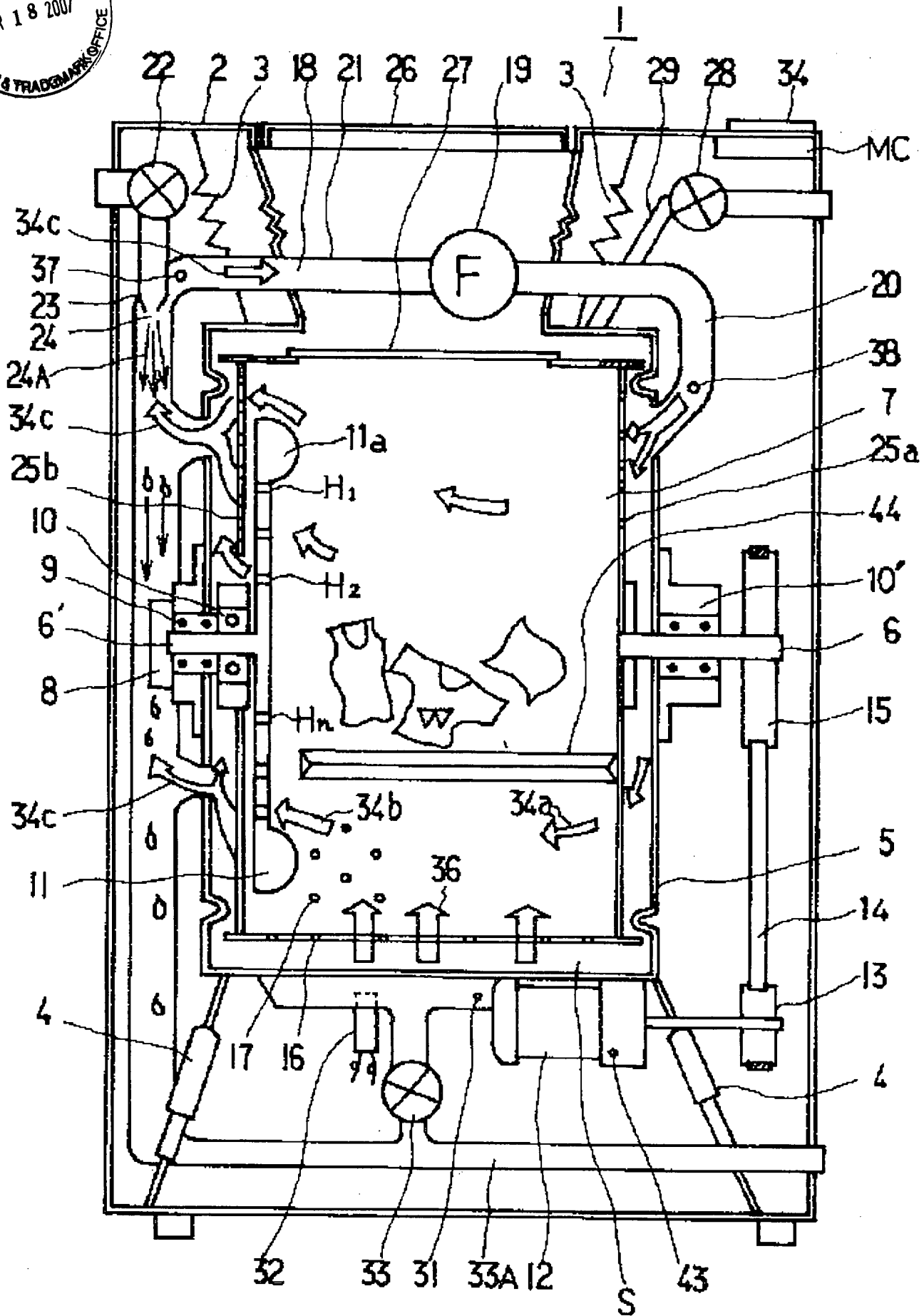
[0034] If predetermined time amount (it changes with amounts of the washing) passes and the washing is fully heated The drum warm air sensor 40 formed in the tank 5 detects default value temperature. The ventilation fan motor 19 drives, circulation ventilation is started, 34a, 34b, and 34c of the circulation style occur, and it is mixed with the warm air 36 introduced into the drum 7, and it is dehumidified by water spray 24A from a dehumidifier 23 after ***** (ing) evaporation.

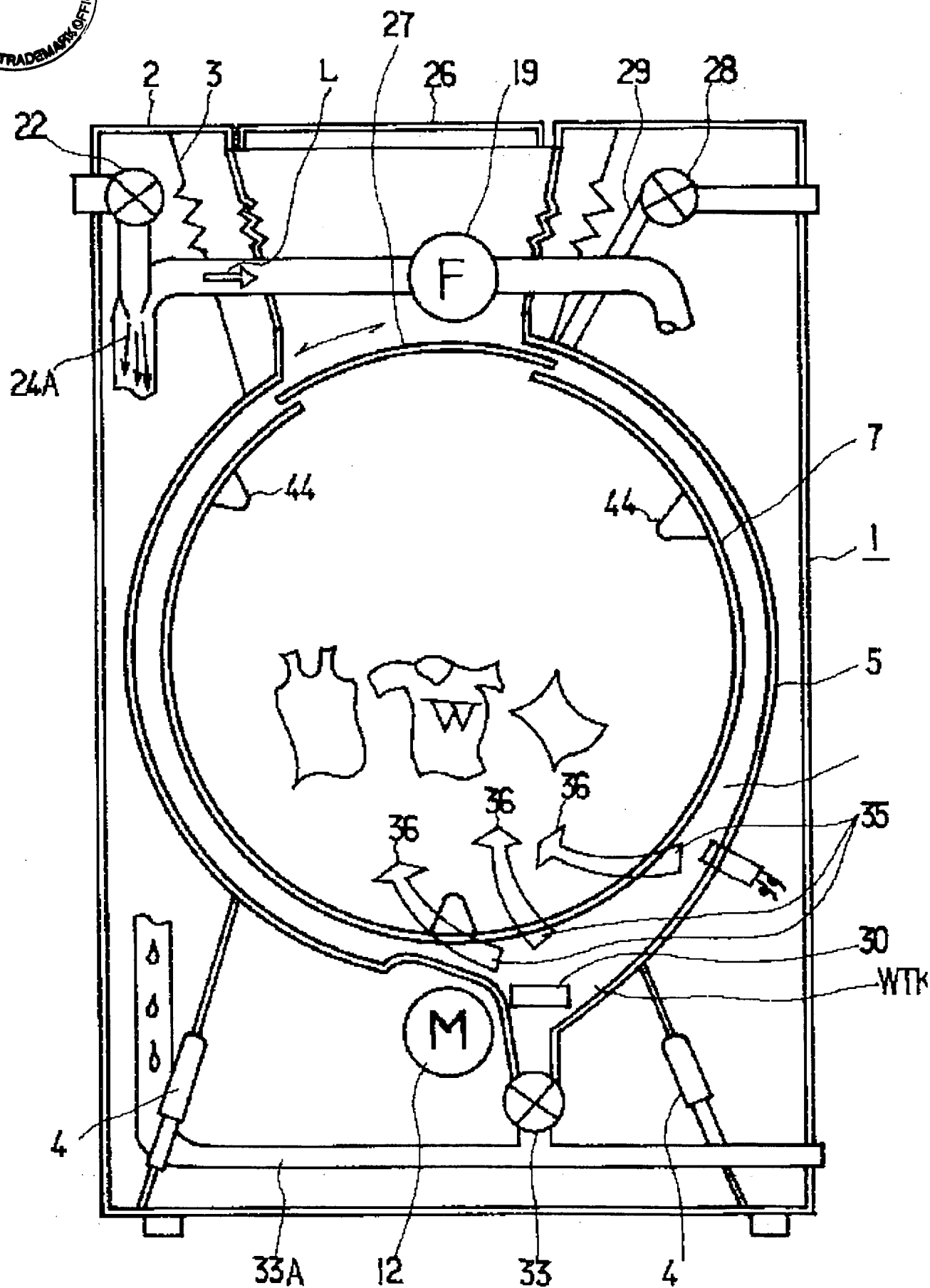
[0035] And as for damp mixture-of-gas 34c, dehumidification advances by water spray 24A, and if Washing W is dried in accordance with the temperature characteristic of thermistors 37 and 38 as shown in drawing 7, a desiccation process will reach through a constant rate period at a desiccation termination term. Then, if the temperature of Washing W begins to rise and is left as it is, after desiccation goes through termination (100% desiccation), Washing W will serve as an elevated temperature and will be in fault dryness (104 - 107% desiccation). At the almost same temperature as the constant-rate-period temperature which controlled to reduce the input current of the heater 30 which detects the temperature change of a thermistor 37 to a ***** sake, and is equivalent to it in elevated-temperature-ization of this unnecessary washing W at a temperature rise, and was memorized by the control unit MC, the washing temperature in a drum is maintained and desiccation is terminated. The washing becoming an elevated temperature or becoming fault desiccation carries out intentionally conventionally, in order to lose desiccation nonuniformity, but rotation of a drum 7 is resisted in this invention, and since the rocking disk 11 is fixed, or the signal of a thermistor 37 is calculated and the current value of a heater 30 is controlled, there is no need for fault desiccation or elevated-temperature-izing with sufficient desiccation of the washing.

[0036] After desiccation is completed, the energization to a heater 30 stops, with the ventilation fan motor 19, cooling-down of the washing is carried out, it reaches predetermined temperature, and desiccation completes it. Progress of the temperature change of the thermistor 37 after the current control and the constant rate period to the above-mentioned heater 30 and the temperature change when changing the thermal output of a heater 30 into a constant rate period are explained below based on drawing 7. It was a thing illustrating the temperature t measured with a thermistor 37, and conventionally, after the temperature desiccation termination measured with two thermistors, when the


temperature gradient reached set point T , it was controlled so that desiccation was completed.

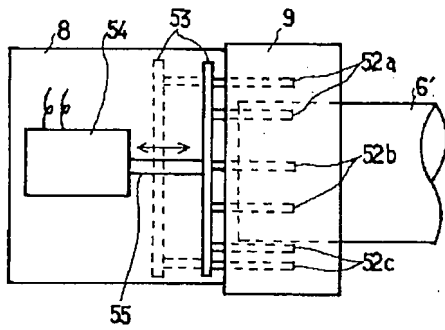
[0037] In this invention, if desiccation advances and temperature-change ΔT of a thermistor 37 is set to about 0, a control unit MC will memorize the constant-rate-drying temperature T .







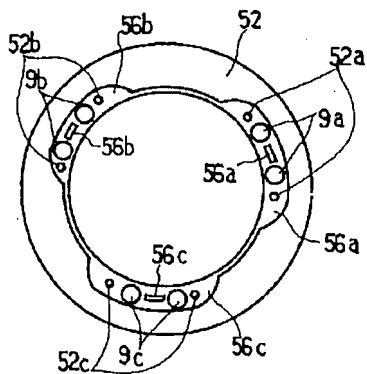
Drawing selection 



[Translation done.]



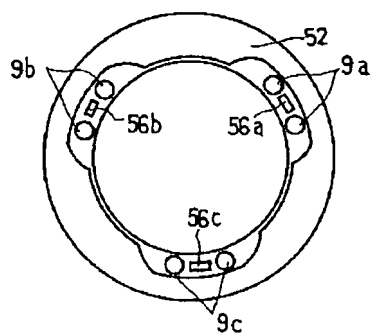
Drawing selection



[Translation done.]



Drawing selection



[Translation done.]

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特開平

19

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る。

【図15】実施例におけるツケ置き工程の動作状態を示すフローチャート図である。

【図16】実施例におけるツケ置き工程の動作状態を示すフローチャート図である。

【図17】実施例における洗い工程の動作状態を示すフローチャート図である。

【図18】実施例における洗い工程の動作状態を示すフローチャート図である。

【図19】実施例におけるすすぎ／脱水工程の動作状態を示すフローチャート図である。

【図20】実施例におけるすすぎ／脱水工程の動作状態を示すフローチャート図である。

【図21】実施例における乾燥工程の動作状態を示すフローチャート図である。

【図22】実施例における乾燥工程の動作状態を示すフローチャート図である。

【図23】実施例のドラム内に洗濯物を入れ給水しタンブリング運転が行われる過程の減水変化を示す特性図である。

【図24】実施例のドラム内に洗濯物を入れたバランス時の振幅状態を示す特性図である。

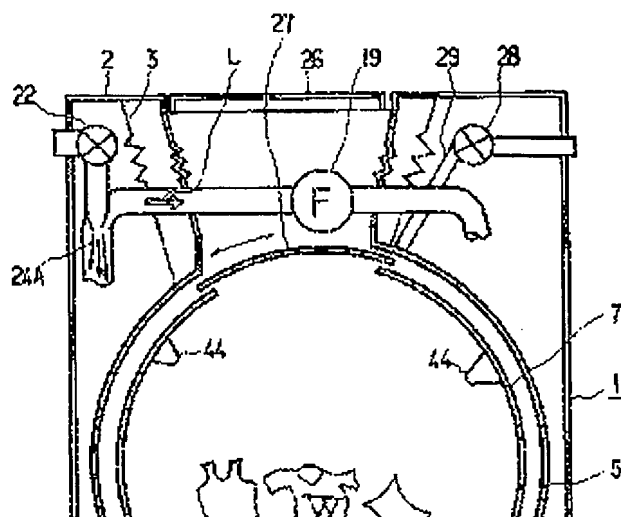
【図25】実施例のファジィ推論装置のブロック図である。

*【符号の説明】

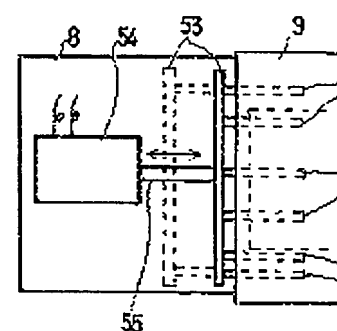
- 1 全自動洗濯乾燥機の本体
- 5 水槽
- 6 水平軸
- 7 ドラム
- 8 双方向固定ベアリング制御装置
- 11 揺動ディスク
- 12 直流モータ
- 19 送風用ファンモータ
- 20, 21 送風ダクト
- 30 ヒータ
- 31 水温センサー
- 32 水位センサー
- 34 a, b, c 循環風
- 35 回転流風
- 36 導入風
- 37 サーミスタ
- 40 ドラム温度センサー
- 42 揺動センサー
- 43 回転センサー
- 80 ファジィ制御装置
- 81 前処理装置
- 82 ファジィ推論装置

*

【図2】



【図3】

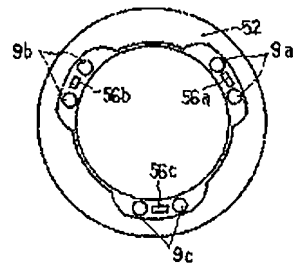


【図4】



特開平5-3990

【図5】



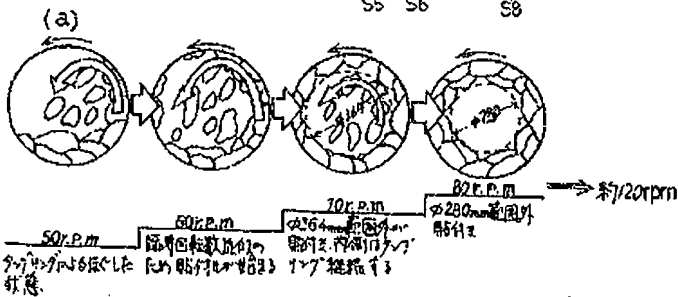
```
graph TD
    Start(( )) --> S304{電源電圧が10V以下か?}
    S304 -- YES --> S305[ヒューズ電流値を修正する]
    S304 -- NO --> S306{電源電圧が12V以下か?}
    S306 -- YES --> S307[電源電圧を修正する]
    S306 -- NO --> S308{電源電圧が14V以下か?}
    S308 -- YES --> S309[ヒューズ電流値を修正する]
    S308 -- NO --> S310{電源電圧が16V以下か?}
    S310 -- YES --> S311[ヒューズ電流値を修正する]
    S310 -- NO --> S312{電源電圧が18V以下か?}
    S312 -- YES --> S313[ヒューズ電流値を修正する]
    S312 -- NO --> S314[電源電圧を修正する]
    S314 --> S304
```

Flowchart illustrating the control method for the power supply system:

- Start (represented by a circle with a dot).
- Decision S304: 電源電圧が10V以下か? (Is the power supply voltage 10V or below?).
 - If YES, proceed to S305: ヒューズ電流値を修正する (Correct the fuse current value).
 - If NO, proceed to S306.
- Decision S306: 電源電圧が12V以下か? (Is the power supply voltage 12V or below?).
 - If YES, proceed to S307: 電源電圧を修正する (Correct the power supply voltage).
 - If NO, proceed to S308.
- Decision S308: 電源電圧が14V以下か? (Is the power supply voltage 14V or below?).
 - If YES, proceed to S309: ヒューズ電流値を修正する (Correct the fuse current value).
 - If NO, proceed to S310.
- Decision S310: 電源電圧が16V以下か? (Is the power supply voltage 16V or below?).
 - If YES, proceed to S311: ヒューズ電流値を修正する (Correct the fuse current value).
 - If NO, proceed to S312.
- Decision S312: 電源電圧が18V以下か? (Is the power supply voltage 18V or below?).
 - If YES, proceed to S313: ヒューズ電流値を修正する (Correct the fuse current value).
 - If NO, proceed to S314.
- Process S314: 電源電圧を修正する (Correct the power supply voltage).
- Loop back from S314 to S304.

脱水制御フローチャート

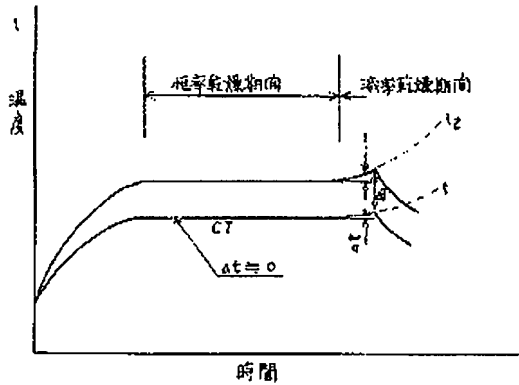
```
graph TD; Start([開始]) --> Wash[洗濯 S1]; Wash --> Dehydrate[脱水 S2]; Dehydrate --> Drain[排水 S3]; Drain --> Dry{乾燥}; Dry -- 小 --> Dehydrate; Dry -- 大 --> End([終了]); Dehydrate -- S7 --> Dry; End --> Dry; Dry -- S8 --> Dehydrate; Dehydrate -- S5 --> Dehydrate; Dehydrate -- S6 --> Dehydrate; Dehydrate -- S4 --> Dehydrate;
```



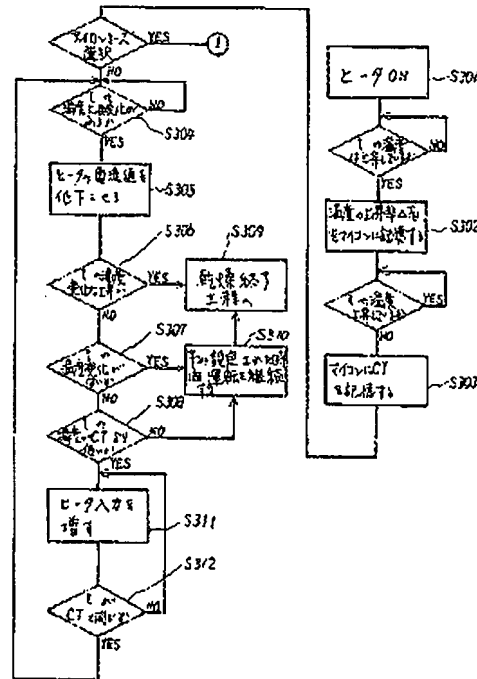
(13)

特開平5-3990

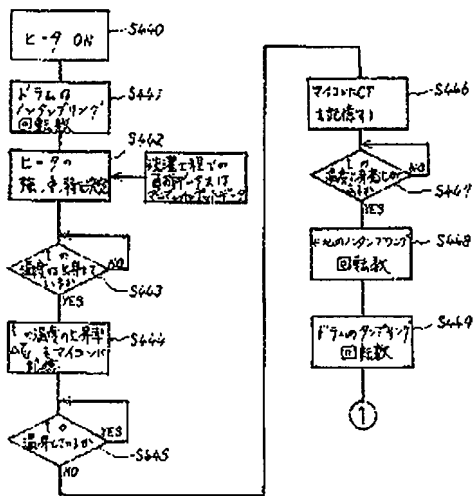
【図7】



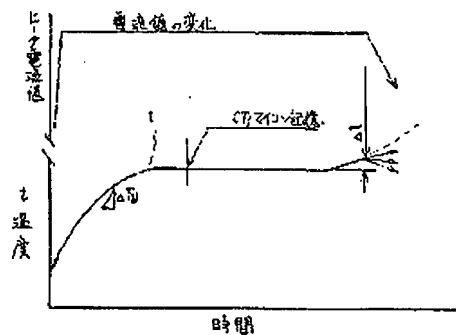
【図8】



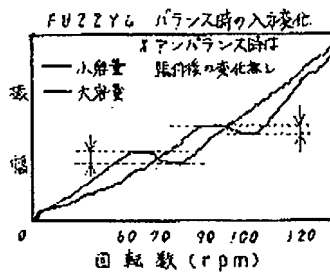
【図10】



【図12】

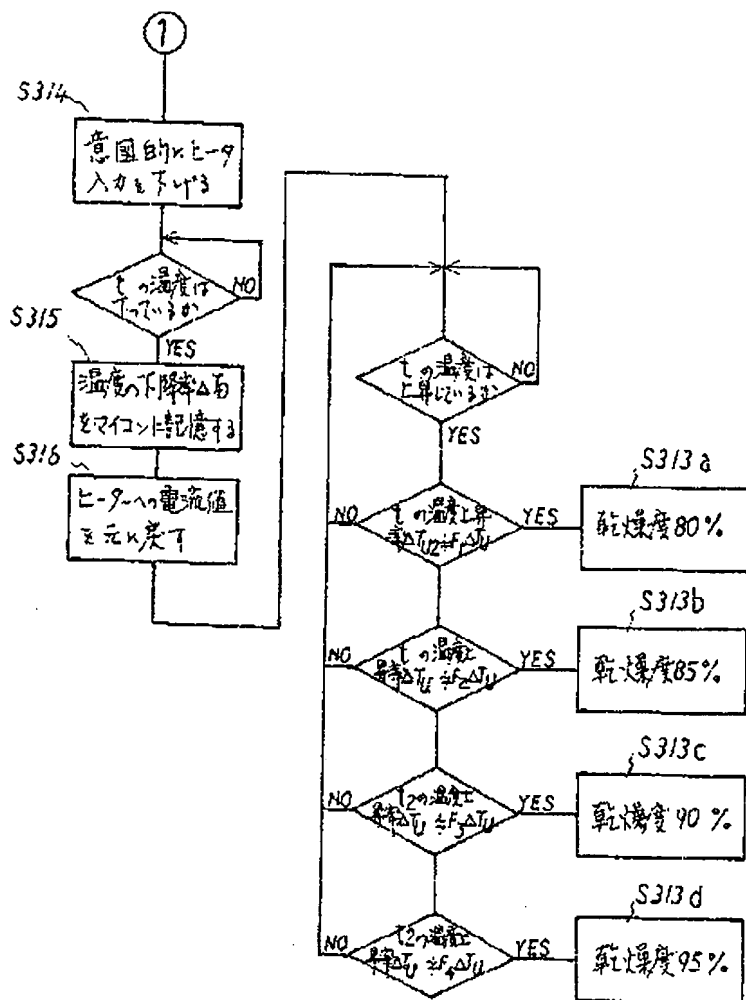


【図24】



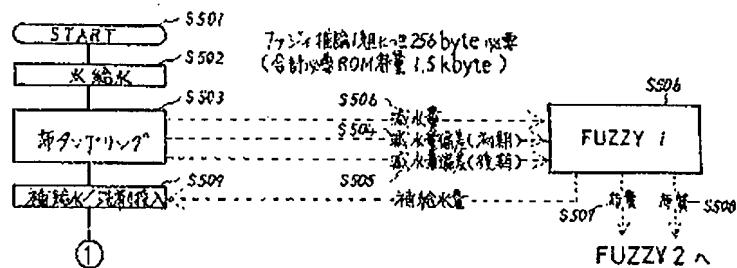
特開平5-3990

【图9】



【图 15】

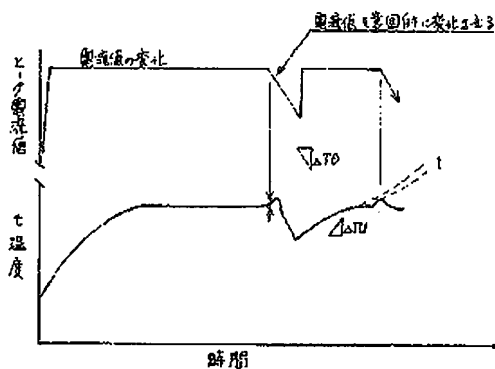
＜つけ置き＞



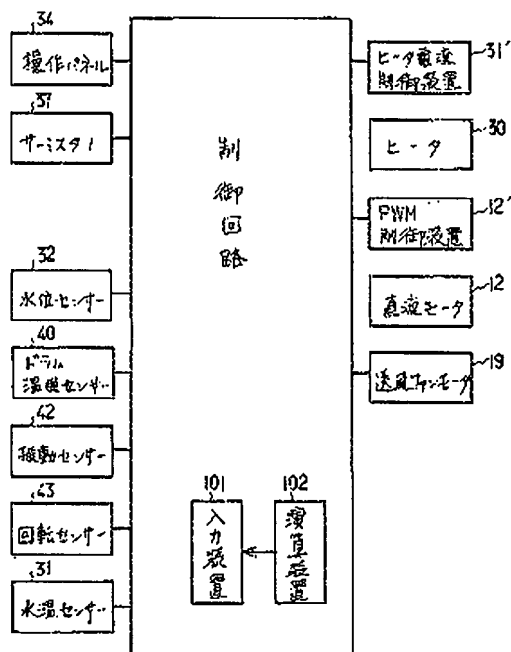
(15)

特開平5-3990

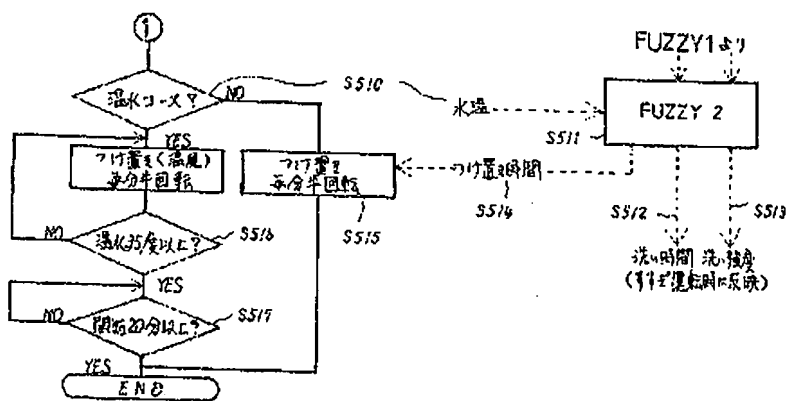
【図13】



【図14】

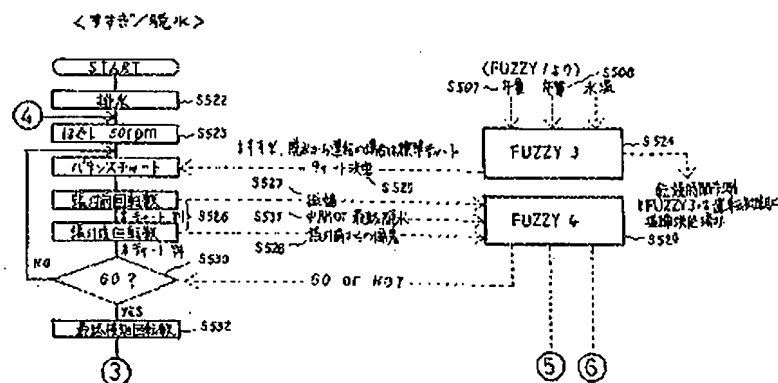


【図16】



特開平5-3990

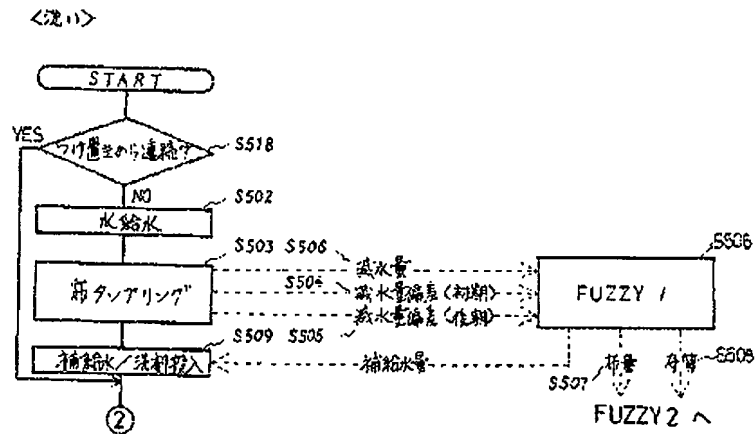
【圖 17】



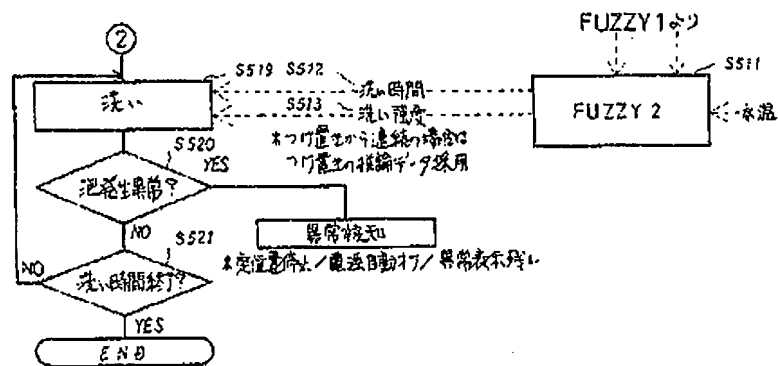
(15)

特開平5-3990

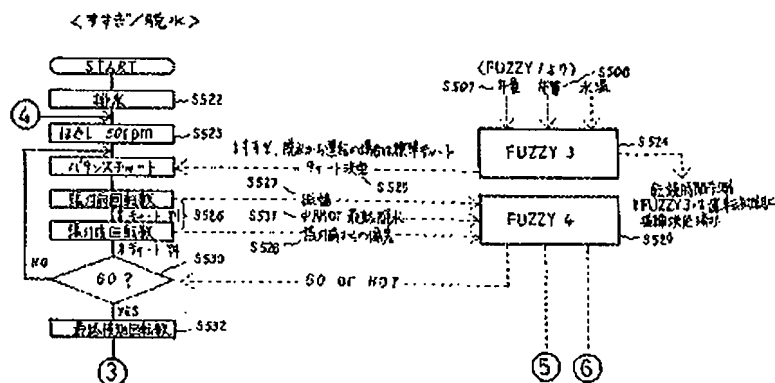
【圖 17】



【图 18】



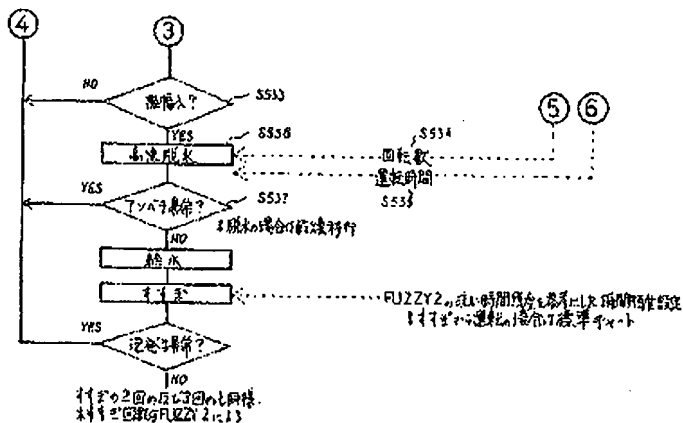
【図19】



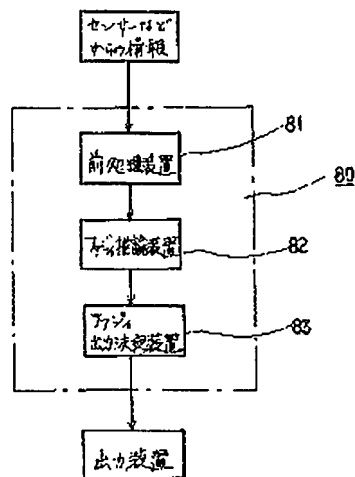
(17)

特開平5-3990

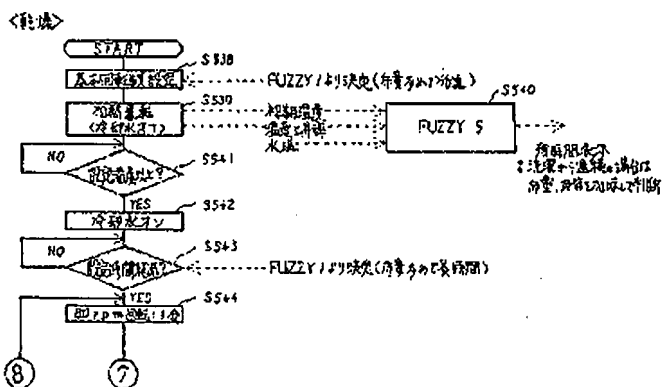
【図20】



【図25】



【図21】



【図22】

